

REMARKS

Applicant respectfully requests reconsideration of the present application in view of the foregoing amendments and in view of the reasons that follow.

Claims 10, 18 and 19 are currently being amended.

This amendment changes claims in this application. A detailed listing of all claims that are, or were, in the application, irrespective of whether the claim(s) remain under examination in the application, is presented, with an appropriate defined status identifier.

After amending the claims as set forth above, claims 10-24 are now pending in this application.

Allowable Subject Matter

Claims 14 and 21 were objected to for being dependent on rejected base claims 10 and 18 respectively. Since claims 14 and 21 were not rejected in view of the prior art, Applicants assume that claims 14 and 21 contain allowable subject matter.

Claim Rejections - 35 U.S.C. § 112

On page 4 of the Office Action the Examiner rejected claim 10 under 35 U.S.C. § 112, second paragraph, as being indefinite for failing to particularly point out and distinctly claim the subject matter which applicant regards as the invention. Specifically, the Examiner asserts that the limitation “a transmitter circuit associated with the tire configured to transmit a plurality of signal pulses in a time the associated tire completes approximately one rotation” is not clear. The Examiner explains that “if vehicle’s speeds are different, for different ‘one rotation’, different numbers of ‘a plurality of signal pulses’ would be recorded in a duration of time; therefore, it is unclear to make comparison of stored pattern(s) of pulses – in another word, which pattern would be used for comparison with obtain signal pulses because of different speeds ‘the time’ would be different with different ‘one rotation’.”

Accordingly, Applicants interpret the Examiner’s remarks as requesting that the comparison carried out by the processing circuit be clarified. In response, Claim 10 has been

amended to clarify the comparison function carried out by the processing circuit.

Specifically, claim 10 recites “compare a signal pattern of the plurality of signal pulses to at least one of the predetermined signal patterns, and to determine the position of the tire on the vehicle based on a comparison.”

According to one example given in Applicants’ specification:

[T]he tire sensor can begin transmitting signal pulses using the 20% duty cycle. Accordingly, the tire sensor will transmit a localization signal as a series of signal pulses. The duration of each pulse can be less than the time that it takes a tire to complete approximately one rotation at travelling speeds. Preferably, the duration of each pulse is a relatively small fraction of the time that it takes a tire to complete approximately one rotation at travelling speeds. Generally, travelling speeds can be defined as speeds where a tire makes a full rotation in approximately 80 milliseconds, or 40 miles per hour. However, travelling speeds can be other speeds as well, such as any speed between 1-2 miles per hour and 80 miles per hour or more. *See ¶ [0037].*

Processing circuit 38 can compare these characteristics of the received signal pattern for a pulsed signal to similar characteristics of a predetermined signal pattern to determine whether the pulsed signal correlates with the predetermined signal pattern. In the exemplary embodiment shown in FIG. 3, the pattern in graph 50 roughly correlates to the pattern in graph 42. Although the continuous pattern in graph 42 is not received in the pulsed signal, the pulsed signal provides enough data such that a comparison can be made between the received signal pattern and the continuous pattern in graph 42 to recognize the correlation. The comparison can be implemented using standard mathematical algorithms and digital processing techniques that are well known in the art. *See ¶ [0043].*

Thus, the claimed processing circuit can compare characteristics of the received signal pattern for a pulsed signal to similar characteristics of a predetermined signal pattern to determine whether the pulsed signal correlates with the predetermined signal pattern. Further, because the claimed processing circuit is configured to “periodically restart a timing of the receiver circuit upon receipt of at least one of the plurality of signal pulses to synchronize a timing of the transmitter circuit with the timing of the receiver circuit,” changes in the speed of the vehicle are accounted for by the processing circuit.

It should be noted that the systems described above are only examples, and the meaning of the limitation “compare a signal pattern of the plurality of signal pulses to at least one of the predetermined signal patterns, and to determine the position of the tire on the vehicle based on a comparison” (or any variation thereof) is not intended to be confusing or to be limited in scope by any exemplary embodiment disclosed in the written description of the Application.

Accordingly, claim 10 (as amended) is definite and in compliance with 35 U.S.C. § 112 ¶ 2. Thus, the Applicants request withdrawal of the rejection of Claim 10 under 35 U.S.C. § 112 ¶ 2.

Claim Rejections – 35 U.S.C. § 103(a)

On pages 5 and 6 of the Office Action the Examiner rejected Claims 10-13, 15-20 and 22-24 as being obvious over U.S. Patent No. 6,988,026 titled “Wireless and Powerless Sensor and Interrogator” to Breed et al. (“Breed”) in view of U.S. Patent Publication No. 2003/0107481 titled “Tire Condition Monitoring Apparatus and Method” to Sawafuji (“Sawafuji”) and in view of U.S. Patent No. 5,095,744 titled “Ultrasonic Tire Testing Method and Apparatus” to Macecek (“Macecek”) under 35 U.S.C. § 103(a).

The Examiner stated that:

Breed et al. show that claimed concept in col. 13 lines 61-65, col. 76 lines 11-28, and using pattern recognition technology. It is clear that in order to use that pattern recognition technology, Breed et al.'s system contain memory storages.

Sawafuji clearly discloses that "even when the positions of the tires are changed, the receiver can easily identify the tire that corresponds to the received data" (see Sawafuji, the abstract). In these above pending claims, the applicants claim a system to determining the position of a tire on a vehicle using signal pulses; including receiving signal pulses from a transmitter associated with the tire in the time the tire completes approximately one rotation, providing a predetermined signal pattern associated with a unique tire position on the vehicle, and comparing signal pulses to the predetermined signal pattern to determine the position of the tire on the vehicle - this is obviously done by the teaching of

Breed et al. (US Pat. 6,988,026), in view of Macecek et al. (US Pat. 5,095,744).

Macecek et al. (US Pat. 5,095,744) also teach what applicants claimed by using initially comparing values of the data from the receiver 104. If the present test pattern length does not exceed a maximum value, a decision step 454 causes the data for the receiver 104 to be processed using the present test pattern length; and using pulses of ultrasound at various locations to locate a specific tire (see Macecek et al., claim 20).

The Examiner concluded that:

It would have been obvious to one having ordinary skill in the art at the time the invention was made to combine the teachings of Breed et al., Sawafuji, and Macecek et al. to determining the position of a tire on a vehicle using a periodically transmitted signal, or using signal pulses and predetermined signal patterns for the advantage of recognizing individual pattern of each tire to accurately, and quickly knowing position of a tire in a vehicle.

Breed is directed to a wireless and powerless sensor and interrogator. Breed discloses inflating tires with different pressures according to a pattern using pressure indicators of received signals to identify individual tire positions. *See* Col. 13, lines 61-65. Further, Breed discloses determining the angular position of a tire using a RF signal. *See* Col. 76, lines 22-25. Sawafuji is directed to a tire condition monitoring apparatus having a plurality of transmitters located on tires and a receiver for determining the position of each tire, based, in part, on the vehicle speed. *See* Abstract; ¶ 30. Macecek is directed to an ultrasonic tire testing method. Macecek discloses that a transmitter outside the tire applies pulses of ultrasound to the tire to identify defects in the tire. *See* Abstract. Further, claim 20 of Macecek recites that a pulse location control means is used to establish locations around the tire at which an ultrasonic transmitter will be excited.

Claim 10 (as amended) is in independent form and recites a “system for determining the position of a tire on a vehicle using a periodically transmitted signal” comprising, in combination with other elements, “a processing circuit configured to periodically restart a timing of the receiver circuit upon receipt of at least one of a plurality of signal pulses to

synchronize a timing of the transmitter circuit with the timing of the receiver circuit.” Claims 11-17 depend from independent Claim 10 (as amended).

The system recited in independent Claim 10 (as amended) would not have been obvious in view of Breed, alone or in any proper combination with Sawafuji and Macecek under 35 U.S.C. § 103(a). Breed, alone or in any proper combination with Sawafuji and Macecek, does not disclose, teach or suggest a system comprising “a processing circuit configured to periodically restart a timing of the receiver circuit upon receipt of at least one of a plurality of signal pulses to synchronize a timing of the transmitter circuit with the timing of the receiver circuit.” Periodically restarting the timing of the receiver circuit to synchronize the timing of the transmitter circuit with the timing of the receiver circuit compensates for changes in vehicle speed and eliminates the need to monitor the vehicle speed continuously. In contrast, Sawafuji does not disclose periodically restarting a timing of a receiver circuit and transmitter circuit to account for changes in vehicle speed. Instead, Sawafuji discloses a reception controller that must take speed data supplied by a vehicle speed sensor into consideration in determining the position of tires. *See* ¶ [0030]. Breed and Macecek also fail to cure the deficiencies of Sawafuji. To transform the interrogator of Breed, the apparatus of Sawafuji and the apparatus of Macecek into a system as recited in Claim 10 would require still further modification, and such modification is taught only by the Applicants’ own disclosure.

The system recited in independent Claim 10, considered as a whole, would not have been obvious in view of Breed, Sawafuji and Macecek. The rejection of Claim 10 (as amended) over Breed, Sawafuji and Macecek under 35 U.S.C. § 103(a) is improper. Therefore, Claim 10 is patentable over Breed, Sawafuji and Macecek.

Dependent Claims 11-17, which depend from independent Claim 1, are also patentable. *See* 35 U.S.C. § 112 ¶ 4.

Claim 18 (as amended) is in independent form and recites a “system for determining the position of a tire on a vehicle using a plurality of signal pulses” comprising, in combination with other elements, “a circuit configured to: periodically restart a timing of the

circuit upon receipt of at least one of the plurality of signal pulses to synchronize a timing of the circuit with a timing of a transmitter.” Claims 19-24 depend from independent Claim 18 (as amended).

The system recited in independent Claim 18 (as amended) would not have been obvious in view of Breed, alone or in any proper combination with Sawafuji and Macecek under 35 U.S.C. § 103(a). Breed, alone or in any proper combination with Sawafuji and Macecek, does not disclose, teach or suggest a system comprising, in combination with other elements, “a circuit configured to: periodically restart a timing of the circuit upon receipt of at least one of the plurality of signal pulses to synchronize a timing of the circuit with a timing of a transmitter.” Periodically restarting the timing of the circuit to synchronize the timing of the transmitter circuit with the timing of the circuit compensates for changes in vehicle speed and eliminates the need to monitor the vehicle speed continuously. In contrast, Sawafuji does not disclose accounting for changes in vehicle speed by periodically restarting the timing of a circuit to synchronize the circuit with the transmitter circuit. Instead, Sawafuji discloses a reception controller that must take speed data supplied by a vehicle speed sensor into consideration in determining the position of tires. *See* ¶ [0030]. Breed and Macecek also fail to cure the deficiencies of Sawafuji. To transform the interrogator of Breed, the apparatus of Sawafuji and the apparatus of Macecek into a system as recited in Claim 18 would require still further modification, and such modification is taught only by the Applicants’ own disclosure.

The system recited in independent Claim 18, considered as a whole, would not have been obvious in view of Breed, Sawafuji and Macecek. The rejection of Claim 18 over Breed, Sawafuji and Macecek under 35 U.S.C. § 103(a) is improper. Therefore, Claim 18 is patentable over Breed, Sawafuji and Macecek.

Dependent Claims 19-24, which depend from independent Claim 18, are also patentable. *See* 35 U.S.C. § 112 ¶ 4.

Accordingly, the Applicants respectfully request withdrawal of the rejection of Claims 10-24 under 35 U.S.C. § 103(a).

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Applicants believe that the present application is now in condition for allowance.
Favorable reconsideration of the application as amended is respectfully requested.

The Examiner is invited to contact the undersigned by telephone if it is felt that a telephone interview would advance the prosecution of the present application.

The Commissioner is hereby authorized to charge any additional fees which may be required regarding this application under 37 C.F.R. §§ 1.16-1.17, or credit any overpayment, to Deposit Account No. 19-0741. Should no proper payment be enclosed herewith, as by a check being in the wrong amount, unsigned, post-dated, otherwise improper or informal or even entirely missing or a credit card payment form being unsigned, providing incorrect information resulting in a rejected credit card transaction, or even entirely missing, the Commissioner is authorized to charge the unpaid amount to Deposit Account No. 19-0741. If any extensions of time are needed for timely acceptance of papers submitted herewith, Applicants hereby petition for such extension under 37 C.F.R. §1.136 and authorize payment of any such extensions fees to Deposit Account No. 19-0741.

Respectfully submitted,

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